Relation Between Deep Neck Flexor Endurance, Proprioception Kinesiophobia and effect of Tele-rehabilitation: A Multi-Phasic Study on Text Neck Syndrome.

SHORT SYNOPSIS

Submitted partial fulfillment of the requirement of the degree of

DOCTOR OF PHILOSOPHY

to

Manav Rachna International Institute of Research and Studies (Deemed to be University)

by

Khyati Varshney

12203MRIIRSPHD2N002

Under the supervision of

Dr. KSHITIJA BANSAL
Professor
School of Allied Health Sciences

SCHOOL OF ALLIED HEALTH SCIENCES
DEPARTMENT OF PHYSIOTHERAPY
MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES
SECTOR-43, SURAJKUND –DELHI ROAD, FARIDABAD – 12100

SCHOOL OF ALLIED HEALTH SCIENCES

Certificate

I hereby declare that the short synopsis Title "**Relation Between Deep Neck Flexor Endurance, Proprioception, Kinesiophobia and effect of Tele-rehabilitation: A Multi-Phasic Study on Text Neck Syndrome**"being submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy in physiotherapy under School of Allied Health Sciences of Manav Rachna International Institute of Research & Studies, Faridabad during the academic year 2022 It is a bona fide record of original work carried out under the supervision of Dr. Kshitija Bansal and has not been submitted in full or part to any other university or institute for degree or diploma. Further, it is certified that short synopsis is plagiarism free and proof has been submitted.

Khyati Varshney
12203MRIIRSPHD2N002

Signature of the Supervisor
Dr. Kshitija Bansal
Professor, Department of Physiotherapy
SAHS, MRIIRS

Dr. Nitesh Malhotra
(Chairperson, DRC)

Dr. Puneet Batra
(Dean, School of Allied Health Sciences)

ABSTRACT

Introduction- Text Neck Syndrome is a repetitive stress injury resulting from prolonged neck flexion at various angles, often caused by excessive use of handheld devices like mobile phones for texting or viewing content over extended periods.

Aim - This study aimed to investigate the relationship between kinesiophobia, neck proprioception, deep neck flexor endurance, and the effects of tele-rehabilitation in individuals suffering from Text Neck Syndrome.

Methodology - This proposed study consists of two phases. Study design of Phase I and Phase II will be a cross-sectional and an experimental pre- and post-respectively. After Ethical approval from MRIIRS, individuals with Text neck syndrome of 18-25 years of age will be screened for eligibility. The whole procedure of research will be explained to the participants and the consent will be obtained. Base line parameters of kinesiophobia, proprioception and muscle endurance will be evaluated.

Key words: Text neck syndrome, kinesiophobia, neck proprioception, NDI, NPRS

CONTENTS

S. No.	Description	Page No.
1.	Introduction	5-6
2.	Literature Review	7-8
3.	Research Gaps and Problem Statement	9
4.	Research Objectives	10
5.	Research Methodology	11-15
7	References	16-17
8	Annexure	18-24

INDRODUCTION

Text Neck Syndrome:

Neck pain is a major contributor to disability around the globe. Due to technological advances and need of the hour the reliance on personal computers and smartphones is ever rising. This has significantly contributed to increased neck pain, particularly among young adults and adolescents (Singh S, Kaushal K, Jasrotia S 2020). The term "Text Neck" was first introduced by U.S. chiropractor Dr. Dean L. Fishman (Hansraj, Kk 2014) and is often referred to as a modern-era ailment (Kumar S, Kumar R, and Sharma D 2021). The prevalence of text neck syndrome was reported to be 43.6% and 42.5%, in Pakistan and India respectively. A study by Kumari S et al 2021 reports 76.6% prevalence of text neck syndrome in student population.

According to Sathya, P., & Tamboli, S. (2020) the main clinical symptoms include neck pain, stiffness, and soreness, along with other related issues such as eye strain (12%), dry eyes (7%), nearsightedness (3%), general irritability (82%), stress (62%), anxiety (59%), and difficulties in communication (82%) (Fares, J.; Fares et al 2017). These causes decrease in productivity of an individual which eventually leads economic burden. (Moretti A, et al 2020).

Kinesiophobia:

Kinesiophobia is excessive fear of physical movement, which is predominantly arises from anticipation or feeling of vulnerability to painful injury (Luque-Suarez, A.; Martinez-Calderon, J.; Falla, D 2019). This is commonly seen in low back and neck pain patients. The effects of kinesiophobia on individuals with chronic neck pain have garnered significant attention. Numerous studies have demonstrated a link between kinesiophobia, pain intensity, functional disability, and overall quality of life. However, there is limited research exploring the correlation between kinesiophobia and proprioception (Asiri F 20221, Gunay U 2019), as well as muscle endurance, highlighting the need for further investigation. This study aims to enhance understanding of the relationships among these factors in individuals with Text Neck Syndrome.

Proprioception:

Proprioception, particularly cervical joint position sense, is essential for maintaining proper head orientation. Cervical proprioception is the combined functions of proprioceptors along with inputs from the vestibular and visual systems. This sense plays a pivotal role in ensuring correct posture and functional balance, which can help minimize the risk of repetitive stress injuries and postural imbalances.

Impaired proprioception is linked to risk of joint damage, injuries, and falls (Anderson V B & Wee E 2011; Hryvniak D. et al 2021). The exact cause of decreased Proprioception is unclear Previous studies conducted confirms proprioception impairment seen in cervical spondylosis (Reddy RS 2019).

Deep Neck Flexors Strength and endurance:

Deep Neck flexors are the equivalent to the Core for the neck. Thus, Deep neck flexors play a vital role in prevention of neck pain, injury prevention and improving posture through maintaining cervical lordosis. The weakness and faulty recruitment pattern lead to postural malalignment, cervicogenic headaches etc. The main cause for this has been reported as Injury to the cervical region, or prolonged postures which further can cause these muscles to become underactive.
In spite of their important role, the strength and endurance of these muscles are many a times overlooked. Thus, this study aims to study the current status of deep neck flexor endurance in individuals with Text neck syndrome.

Management of Text neck syndrome:

Physiotherapy has been proven to be effective in managing neck pain along with postural corrections and ergonomic advices. Physiotherapy services are available on OPD basis. But due to time constrains many a times patient miss the sessions and that has impact on their recovery. The advancement of technology can overcome these problems. Telerehabilitation involves using information and communication technologies to deliver rehabilitation services to individuals remotely, whether at home or in other settings (Brennan DM 2009). This approach offers numerous advantages for both clinicians and patients, empowering patients to take charge of their condition management (Brennan DM 2009).

Need of the Study:

The issue of Text Neck Syndrome is increasingly gaining attention typically in young population. With the global proliferation of smartphones, there is a pressing need for more studies investigating this condition across various countries. The association of various factors like proprioception, muscle performance, psychological dysfunctions in terms of fear of activity and activity avoidance behaviors during the use of gadgets like smart phone, computer, laptop etc. is still unclear in the literature. Therefore, there is definite need to study the relation between kinesiophobia, proprioception, muscle endurance in text neck syndrome becomes all the more important for effective planning of its management based on bio- psychosocial model of rehabilitation. The results of this study will be helpful to understand the condition and its effect on the bio-psychosocial domain which can further be utilized to develop effective intervention strategy by Physiotherapists.

Literature Review

Daniela David et al. 2021 conducted a study on Text Neck Syndrome in children and adolescents to explore it in depth. Their results emphasize the importance of early diagnosis and intervention, particularly by examining the global prevalence of this issue in young people who regularly use smartphones and computers. They also called for additional research utilizing more robust study designs and objective measures of musculoskeletal pain, as current evidence is constrained by reliance on subjective evaluations.

Jawad Fares et al. 2015, investigated musculoskeletal neck pain in children and adolescents, examining its risk factors and associated complications. The study included total of 207, participants under 18 years old from Beirut, Lebanon, who presented with nonspecific neck pain. The findings reported about 180 participants were diagnosed with musculoskeletal neck pain accompanied by muscle spasms along with poor posture while using smartphones and tablets for academic purposes. Furthermore, 21% experienced eye-related symptoms, and 82% reported changes in their psychological and social behaviours.

Supriya Kumari et al. 2021 conducted a prevalence study for text neck syndrome and neck pain among college students. The researchers created a customized questionnaire using Google Forms, which included a consent form, sociodemographic information, the Neck Disability Index (NDI), and a Visual Analog Scale (VAS) to evaluate how neck pain affected daily activities. Of the 283 participants, 36.5% reported mild text neck syndrome, 23.4% reported moderate cases, 2.1% had severe cases, and 35.7% experienced no symptoms. The results revealed a higher prevalence of text neck syndrome than what has been observed in earlier studies.

Neck Proprioception:

Ravi Shankar Reddy et al. 2019 explored the connection between cervical proprioception and the intensity of neck pain in individuals suffering from cervical spondylosis. In this cross-sectional study, 132 subjects with cervical spondylosis and an equal number of healthy controls were assessed for cervical joint position errors (JPE) using a COM device. The results indicated that proprioception was impaired in those with CS compared to healthy control.

Ravi Shankar et al. 2022 compared cervical proprioception and muscle endurance in individuals with general joint hypermobility (GJH), both with and without non-specific neck pain. The aim was to evaluate joint position error (JPE) and muscle endurance in these two groups. The study included 33 GJH participants with non-specific neck pain and 35 asymptomatic GJH participants. Cervical JPEs were assessed in degrees using a cervical range of motion device, while muscle endurance was measured using a stopwatch. The results showed that individuals with GJH and non-specific neck pain had higher cervical JPEs and lower muscle endurance compared to those without neck pain.

Kinesiophobia:

Ilksan Demirbüken et al. 2016 examined the link between kinesiophobia and physical activity in individual suffering from CNP. The study included 34 men and 65 women, measuring pain intensity with a VAS and kinesiophobia using the Tampa Scale. Physical activity levels were assessed through a questionnaire. Results indicated that individuals with CNP reported higher pain intensity and kinesiophobia.
Harriet branstrom et al. 2008 researched degree of kinesiophobia in CNP between men & women, 88 mens and 173 womens with CNP, study involve self administrated questionnaire, disability, pain and tempa scale. Result shows that men having a higher frequency than women.

Neeraj A. Athavale et al. 2018 carried out an observational study to evaluate the awareness of text neck syndrome among young adults, specifically focusing on their knowledge of preventive measures. The study involved 311 participants who filled out a self-administered questionnaire. The findings revealed that awareness of text neck syndrome was notably low among the young adult group.

Exercises for Neck Pain :

Amr Ahmad et al. 2021 conducted a study on the impact of a Tele-Rehabilitation Exercise Program on the ability of patients with neck pain. The study used a purposive sampling technique to gather data from male patients, assessing parameters such as the Neck Disability Index and the Numeric Pain Scale (NPS). The collected data was securely stored for three years before being destroyed. results suggest that tele-rehabilitation could serve as a promising alternative to traditional care, although challenges like internet access and availability of resources may negatively impact the therapy. The study emphasizes the importance of targeted exercise programs for treating neck pain, with a focus on rehabilitating specific cervical muscles.

Desti Kurniawati et al. 2021 researched the impact of the McKenzie Exercise Method on preventing text neck syndrome due to excessive gadget use. This case study involved 26 gamers, who initially filled out surveys via Google Forms for early detection. The research included educational sessions on posture correction for members of the "Titans" Gamers Community. The findings showed an improvement in COM for all participants, demonstrating that the McKenzie exercise effectively enhanced cervical mobility among gamers.

Aim and Objectives of the Study

Aim:

To explore the relation between kinesiophobia, neck proprioception, deep neck flexor endurance and Impact of tele- rehabilitation in Individuals with Text Neck Syndrome.

Objectives:

1. To Study relationship between kinesiophobia, neck proprioception, deep neck flexor endurance in Individuals with Text Neck Syndrome.
2. To study the effectiveness of Conventional physiotherapy on pain, kinesiophobia, neck proprioception, deep neck flexor endurance and Neck disability in Individuals with Text Neck Syndrome.
3. To study the effectiveness of Tele-rehabilitation on pain, kinesiophobia, neck proprioception, deep neck flexor endurance and Neck Disability in Individuals with Text Neck Syndrome.
4. To compare effectiveness of Conventional physiotherapy and Tele-rehabilitation on pain, kinesiophobia, neck proprioception, deep neck flexor endurance and Neck disability in Individuals with Text Neck Syndrome.

Methodology

The proposed study will be divided into 2 phases

Study Design:-

- Phase I - Cross sectional Study
- Phase II – Experimental Pre- post design with 2 parallel groups.

Study Population:- Individuals between the age group 18- 25 years with text neck syndrome.

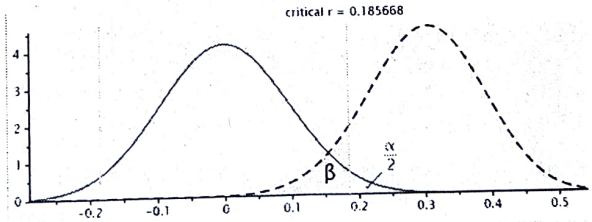
Location:- Delhi/NCR

Sampling Technique:-

- Phase I – Convenient Sampling
- Phase II –Convenient sampling with Random Allocation to 2 groups

Sample Size:-

Phase I: **112** (G power for correlation statistics with two tailed, power 90% alpha= 0.05 and pH1= 0.3)



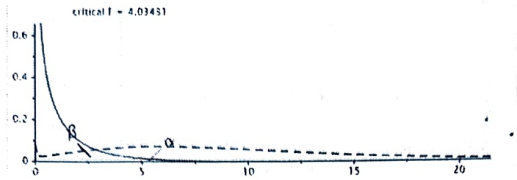
Test family: Statistical test
Exact: Correlation Bivariate normal model

Type of power analysis
A priori Compute required sample size - given α, power, and effect size

Input Parameters		Output Parameters	
Tail(s)	Two	Lower critical r	-0.1856685
Determine = Correlation ρ H1	0.3	Upper critical r	0.1856685
α err prob	0.05	Total sample size	112
Power (1-β err prob)	0.9	Actual power	0.9008078
Correlation ρ H0	0		

Phase II: **30 in each group**

calculated using G power software with Power= 80%, alpha= 0.05, effect size: 0.20 and Reapeated measure ANOVA statistics. The total sample size came out to be 52. with15% drop out rate the adjusted sample size will be 30 in each group.



Test family: F tests — Statistical test: ANOVA: Repeated measures, within-between interaction

Type of power analysis: A priori: Compute required sample size – given α, power, and effect size

Input Parameters		Output Parameters	
Determine = Effect size f	0.20	Noncentrality parameter λ	8.3200000
α err prob	0.05	Critical F	4.0343097
Power (1-β err prob)	0.80	Numerator df	1.0000000
Number of groups	2	Denominator df	50.0000000
Number of measurements	2	Total sample size	52
Corr among rep measures	0.5	Actual power	0.8074866
Nonsphericity correction ε	1		

Selection Criteria:

Inclusion Criteria:

Phase I

- Participants diagnosed with text neck syndrome using self-reported questionnaire
- Neck pain for at least 3 months.
- Age: 18 - 25 years.
- BMI of 18.5 kg/m2 to 24.9 kg/m2 (Asia-pacific guidelines)
- Both the genders

Phase II:

- Participants from Phase I cohort with Moderate to severe kinesiophobia and proprioception deficits.

Exclusion Criteria:

- History of an accident or Injury to cervical spine in last 6 months
- Subjects diagnosed with any Neurological or Cardiovascular Problems.
- subjects diagnosed with cervical spolylolisthesis, PIVD, tumor, Ankylosing spondylitis etc.
- Subjects diagnosed with systemic conditions like Juvenile Diabetes, hypertension.
- Subjects who are currently under any treatment for the same condition

Variables:

- **Independent Variables-** Deep neck flexor endurance, Mckenzie exercises.
- **Dependent Variables-** TAMPA scale, NDI & NPRS.

Instruments/ materials Required:

- Self -administered Questionnaire for text neck syndrome
- Tempa scale
- Cervical Proprioception Laser Beam device.
- Pressure biofeedback unit.
- Chair
- Mobile/ laptop (tele-rehabilitation session)

Outcome Measures:

Primary -

- Tampa Scale for Kinesiophobia.
- Cervical Proprioception
- Deep neck flexor Muscle Endurance

Secondary –

- Neck Disability Index (NDI)
- NPRS (Pain)

Procedure: PHASE I

After Ethical approval from MRIIRS, individuals with Text neck syndrome of 18-25 years of age will be screened for eligibility. The consent will be obtained and the whole procedure of research will be explained to the participants. Base line parameters of kinesiophobia, Cervical proprioception and muscle endurance of the Participants will be measured through TEMPA Scale, cervical joint position test and Deep neck flexors endurance test respectively.

Details of each outcome parameters are as follows:

1. TEMPA Scale: This is self-reported questionnaire which is developed by R. Miller S. Kopri in 1991 to assess the fear of movement or re-injury in an individual. There are 17 items in the questionnaire. Which uses a 4-point Likert scale to assess model of fear-avoidance, fear of work-related activities, fear of movement, and fear of re-injury. The questionnaire will be given to the participants and they will be asked to read the it carefully and give response. The scores range from 17 to 68 where the score of 17 indicates no or negligible kinesiophobia, and the higher scores indicate an increasing degree of kinesiophobia.

2. Cervical Proprioception: The cervical proprioception will be measured by cervical joint position error test (JPE) which measure the ability of an individual to return the head to neural position after the movement. The test will be conducted with an individual seated on chair with Laser pointer installed head band. A target will be positioned on a wall 90 cm away from the participant. The Target will be of approximately 40 cm in diameter with concentric circles marked in 1 cm increments.
   The individual will be instructed to identify their natural resting head position, aligning the laser pointer with the center of the target. With his eyes closed, the he will be asked to move his/her head in a single plane. The individual will verbally indicate when he believes he have returned to the starting position before opening their eyes again. Each direction of motion will be tested three times, recording the best score for analysis. The difference in the laser beam's position on the target between the starting and ending points is measured, with greater displacement indicating a cervical joint position error (Treleaven et al. 2003). For reference, a 7.1 cm error distance corresponds to a significant error of 4.5° (Revel et al. 1991).
3. Deep neck flexors endurance test: The test is reliable and valid to measure neck muscle endurance. The test will be performed in supine lying with a crook-lying position, with the neck in a neutral alignment. Towels will be placed under the participant's head to help achieve the neutral alignment. A pressure biofeedback unit (PBU) will be positioned at the occiput with baseline pressure of 20 mmHg (Jull et al. 2008). Later the participant will move his head vertically, performing the movements gently and slowly. In the first, the pressure will increase 2 mmHg. The participant will be asked to hold this position for 10 seconds. After that, the participant will relax back to 20 mmHg before increasing the pressure again to 24 mmHg, maintaining this for another 10 seconds. This process continues until the pressure reaches 30 mmHg. The maximum pressure to which participant can hold the position is taken as the record of endurance.
   (Jull et al. 2008).

The data will be compiled into Microsoft excel and analysis of corelation will be done through SPSS software.

PHASE II

The participants from cohort pf phase I who will agree to be a part of experimental study two will be randomly divided into 2 groups by block randomization will be used with a block size of 6 to ensure equal distribution of participants across treatment groups. The randomization sequence will be generated using a random number generator and concealed using sealed opaque envelopes.

Apart from baseline parameters, additional information on Pain level with Numerical pain rating scale (NPRS) and Neck Disability Index (NDI) will be recorded.

Intervention:

Group A will receive McKenzie exercises through telerehabilitation by Zoom/ what's App Video call with group of 2-3 participants keeping in mind the principles of group therapy

Group B will receive McKenzie exercises through conventional method in Physiotherapy department with one-to-one session.

GROUP WILL BE DIVIDED

Both the groups will receive intervention for 6 weeks with 3 sessions/ week. Every session will be comprised of exercises will be performed 2 sets with 8-10 repetitions of each exercise with rest of 30 seconds after exercise and 1 minute between the sets.

Following 7 exercises will be given: (Aziz S et al 2016)

1. **Neck Retraction:**
   The Participant will sit upright in a chair with backrest. The exercise will begin with the head aligned with the spine, then the participant will gently pull his head backward away from this alignment before returning to the starting position.
2. **Neck Flexion:** The participant will sit comfortably and relaxed. The head will be bent forward until the chin approaches the sternum. Upon reaching the maximum range of motion, the participant applies overpressure with clasped hands for one second before returning to an upright position.
3. **Neck Retraction and Extension:** The participant will sit straight and retracts his head as far back as possible. Once the retraction limit is reached, then will be instructed to extend their head backward as far as he can. After this, head will be carefully raised back to the neutral upright position. (Syed Adnan Ali 2016).
4. **Retraction and Rotation:** The participant will sit upright and first retracts his head, then rotates it toward the side where he feels pain. After maintaining this position, he will return to a neutral position.
5. **Retraction and Lateral Flexion:** The participant will sit upright and begin the exercise by retracting his head. Then he will laterally flex his neck toward the painful side, placing his second hand over the top of his head. The participant will pull the head toward the painful side as far as possible. After holding this position for one second, he will return to an upright position.

After completion of intervention post invervention assessment will be done, the data will be compiled in Microsoft excel and analysis will be done using SpSS software.

Reference:

1. Neupane, S., Ali, U. T. I., Mathew, A., & College, M. V. S. (2017). Text Neck Syndrome - Systematic Review. Imperial Journal of Interdisciplinary Research, 7, 141–148.
2. Sathya, P., & Tamboli, S. (2020). Prevalence of Text Neck Syndrome In Young-Adult population. *International Journal Medical and Exercise Science.*
3. Kumar R, Kumari S, Bharti P, Sharma D. Nomophobia: A rising concern among Indian students. Ind Psychiatry J 2021
4. Khan, A. F., Gillani, S. F. U. H. S., Khan, A. F., & Wahid, A. (2018). Are you suffering pain neck due to smart phone text neck syndrome. Pakistan Journal of Medical and Health Sciences, 12(3), 1095–1097.
5. Hansraj, K. K. (2014). Assessment of stresses in the cervical spine caused by posture and position of the head. Surgical Technology International, 25, 277–279. http://www.ncbi.nlm.nih.gov/pubmed/25393 825
6. Xie Y, Szeto G, Dai J. Prevalence and risk factors associated with musculoskeletal complaints among users of mobile handheld devices: A systematic review. Appl Ergon 2017;59:132-42.
7. 6. Ahmed S, Akter R, Pokhrel N, Samuel AJ. Prevalence of text neck syndrome and SMS thumb among smartphone users in college-going students: A cross-sectional survey study. J Public Health 2019;29:2-7.
8. 7. AlZarea BK, Patil SR. Mobile phone head and neck pain syndrome: Proposal of a new entity. Headache 2015;251:63.
9. 8. AlAbdulwahab SS, Kachanathu SJ, AlMotairi MS. Smartphone use addiction can cause neck disability. Musculoskeletal Care 2017;15:10-2.
10. 9. Reid S, Portelli A. The effects of 'text neck' on head repositioning a accuracy: A two group comparative study. Physiotherapy 2015;101:e1270.
11. 10.Neck Pain. Mayo Clinic. Mayo Foundation for Medical Education and Research (MFMER). 1998-2022. July 2020, 31.
12. Scott Curtis, DO. All About Neck Pain. Spine-Health. 2019 September 12.
13. Neck Pain: Symptoms, Causes, and How to treat it. Healthline. 2005-2022.
14. Neck Pain. Cleveland Clinic. 2022.
15. Neha Pathak, MD. NeckPain. Web MD. 2021 August 30.
16. Fares, J.; Fares, M.Y.; Fares, Y. Musculoskeletal neck pain in children and adolescents: Risk factors and complications. *Surg. Neurol. Int.* **2017**, *87*, 2.
17. TEXT NECK®: A Global Epidemic. The Text Neck Institute. Available online: http://text-neck.com/ (accessed on 29 August 2016).
18. Chronic Conditions Team. Text Neck: Is Smartphone Use Causing Your Neck Pain? *Healthessentials*. 2015. Available online: https: //health.clevelandclinic.org/2015/03/text-neck-is-smartphone-use-causing-your-neck-pain/ (accessed on 1 September 2016).
19. Kim MS. Influence of neck pain on cervical movement in the sagittal plane during smartphone use. J Phys Ther Sci 2015;27:15-7.
20. Xie Y, Szeto G, Dai J. Prevalence and risk factors associated with musculoskeletal complaints among users of mobile handheld devices: A systematic review. Appl Ergon 2017;59:132-42.
21. Lee JI, Song HS. The correlation analysis between hours of smartphone use and neck pain in the Gachon University students. Acupunct 2014;31:99-109.
    Kim HJ, Kim JS. The relationship between smartphone use and subjective musculoskeletal symptoms and university students. J Phys Ther Sci 2015;27:575-9.
22. Neupane S, Ali UI, Mathew A. Text neck syndrome-systematic review. Imp J Interdiscip Res 2017;3:141-8.

23. AlZarea BK, Patil SR. Mobile phone head and neck pain syndrome: Proposal of a new entity. Headache 2015;251:63. Al-Gharabawi B. Text neck syndrome: A new concern for physical therapists worldwide. EC Orthop 2017;8:89-91.
24. Toh SH, Coenen P, Howie EK, Straker LM. The associations of mobile touch screen device use with musculoskeletal symptoms and exposures: A systematic review. PLoS One 2017;12:1-22.
25. Ahmed S, Akter R, Pokhrel N, Samuel AJ. Prevalence of text neck syndrome and SMS thumb among smartphone users in college-going students: A cross-sectional survey study. J Public Health 2019;29:2-7.
26. Alsalameh AM, Harisi MJ, Alduayji MA, Almutham AA, Mahmood FM. Evaluating the relationship between smartphone addiction/overuse and musculoskeletal pain among medical students at Qassim University. J Family Med Prim Care 2019;8:2953-9.
27. AlAbdulwahab SS, Kachanathu SJ, AlMotairi MS. Smartphone use addiction can cause neck disability. Musculoskeletal Care 2017;15:10-2.
28. Reid S, Portelli A. The effects of 'text neck' on head repositioning accuracy: A two group comparative study. Physiotherapy 2015;101:e1270.
29. Sathya P, Tamboli SA. Prevalence of text neck syndrome in young-adult population. Int J Med Exerc Sci 2020;6:749-59.
30. Shah PP, Sheth MS. Correlation of smartphone use addiction with text neck syndrome and SMS thumb in physiotherapy students. Int J Community Med Public Health 2018;5:2512-6.
31. Shah J, Soni K. Effectiveness of Pilatesalong with Conventional Exercise Program and Conventional Exercise Program Alonein Subjects with Text Neck Syndrome. International Journal of Science and Research (IJSR). 2021;10:1322–6.
32. Numeric Pain Rating Scale [Internet]. Physiopedia. [Cited 2021 Jun 12]. Available:https://www.physio- pedia.com/Numeric_Pain_Rating_Scale.
33. The Neck Disability Index:2.
34. Young JG, Trudeau M, Odell D, Marinelli K, Dennerlein JT. Touch-screen tablet user configurations and case- supported tilt affect head and neck flexion angles. Work. 2012; 41:81e91.
35. Jennifer A Klaber Moffett, David A Jackson, Stewart Richmond, Amanda Farrin.
36. Randomized Trial of a brief Physiotherapy intervention compared with usual physiotherapy for Neck Pain patients: Outcomes and patient's preference. The BMJ 2005; 330:75, January 06.
37. Lee, J. I., & Song, H. S. (2014). The Correlation Analysis between Hours of Smartphone Use And Neck Pain in the Gachon University Students. The Acupuncture, 31(2), 99–109. https://doi.org/10.13045/ACUPUNCT.2014 028
38. Samani, P. P., Athavale, N. A., Shyam, A., & Sancheti, P. K. (2018). Awareness of text neck syndrome in young-adult population. International Journal Of Community Medicine And Public Health, 5(8), 3335– 3339. https://doi.org/10.18203/2394- 6040.IJCMPH20183057

Annexure: I

Screening Questionnaire

The questionnaire consisted of five parts Adapted from Kholoud T. Alsiwed 2021

PART I (Demographical Data)

1. Name –
2. Age –
3. Gender –
4. University/college-
5. Amount of daily smart phone usage-
   a. 2 to 4 hours
   b. 4 to 6 hours
   c. 6 to 8 hours
   d. More than 8 hours

6. Neck position while using their smart phones. Participants were shown an image of different neck position (0°, 15°, 30°, 45°, and 60°) and asked to indicate their most frequent position when using their smartphones –

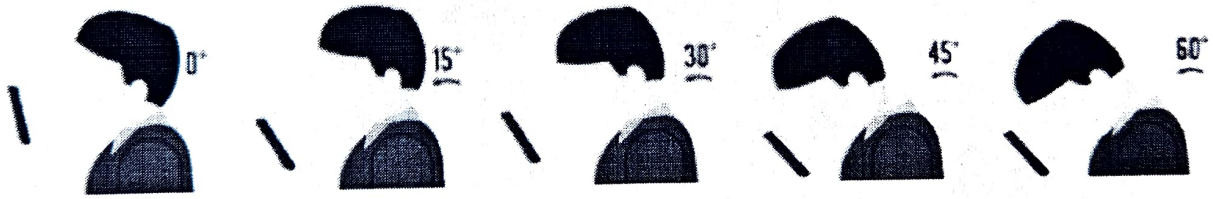


Figure 1: Illustration of neck positions while using a smartphone at varying degrees.

PART II

1. Are you feeling pain on shoulder?

   a. Yes
   b. No

2. Are you feeling pain on lower back?

   a. Yes
   b. No

3. Do you have eye strain?

   a. Yes
   b. No

4. Do you have any near sightedness?

   a. Yes
   b. No

5. Are you feeling irritability?

   a. Yes
   b. No

6. Are you feeling stress?

   a. Yes
   b. No

7. Are you feeling anxiety?

   a. Yes
   b. No

PART III

Smartphone addiction scale – short version (SAS-SV)

	Items	Strongly disagree	Disagree	Weakly disagree	Weakly agree	Agree	Strongly agree
1	Missing planned work due to smartphone use	1	2	3	4	5	6
2	Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use	1	2	3	4	5	6
3	Feeling pain in the wrists or at the back of the neck while using a smartphone	1	2	3	4	5	6
4	Will not be able to stand not having a smartphone	1	2	3	4	5	6
5	Feeling impatient and fretful when I am not holding my smartphone	1	2	3	4	5	6
6	Having my smartphone in my mind even when I am not using it	1	2	3	4	5	6
7	I will never give up using my smartphone even when my daily life is already greatly affected by it	1	2	3	4	5	6
8	Constantly checking my smartphone so as not to miss conversations between other people on Twitter or Facebook	1	2	3	4	5	6
9	Using my smartphone longer than I had intended	1	2	3	4	5	6
10	The people around me tell me that I use my smartphone too much	1	2	3	4	5	6

PART IV

NDI (NECK DISABILITY INDEX)

Section 1: Pain Intensity

- I have no pain at the moment
- The pain is very mild at the moment
- The pain is moderate at the moment
- The pain is fairly severe at the moment
- The pain is very severe at the moment
- The pain is the worst imaginable at the moment

Section 2: Personal Care (Washing, Dressing, etc.)

- I can look after myself normally without causing extra pain
- I can look after myself normally but it causes extra pain
- It is painful to look after myself and I am slow and careful
- I need some help but can manage most of my personal care
- I need help every day in most aspects of self care
- I do not get dressed, I wash with difficulty and stay in bed

Section 3: Lifting

- I can lift heavy weights without extra pain
- I can lift heavy weights but it gives extra pain
- Pain prevents me lifting heavy weights off the floor, but I can manage if they are conveniently placed, for example on a table
- Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned
- I can only lift very light weights
- I cannot lift or carry anything

Section 4: Reading

- I can read as much as I want to with no pain in my neck
- I can read as much as I want to with slight pain in my neck
- I can read as much as I want with moderate pain in my neck
- I can't read as much as I want because of moderate pain in my neck
- I can hardly read at all because of severe pain in my neck
- I cannot read at all

Section 5: Headaches

- I have no headaches at all
- I have slight headaches, which come infrequently
- I have moderate headaches, which come infrequently
- I have moderate headaches, which come frequently
- I have severe headaches, which come frequently
- I have headaches almost all the time

Section 6: Concentration

- I can concentrate fully when I want to with no difficulty
- I can concentrate fully when I want to with slight difficulty
- I have a fair degree of difficulty in concentrating when I want to
- I have a lot of difficulty in concentrating when I want to
- I have a great deal of difficulty in concentrating when I want to
- I cannot concentrate at all

Section 7: Work

- I can do as much work as I want to
- I can only do my usual work, but no more
- I can do most of my usual work, but no more
- I cannot do my usual work
- I can hardly do any work at all
- I can't do any work at all

Section 8: Driving

- I can drive my car without any neck pain
- I can drive my car as long as I want with slight pain in my neck
- I can drive my car as long as I want with moderate pain in my neck
- I can't drive my car as long as I want because of moderate pain in my neck
- I can hardly drive at all because of severe pain in my neck
- I can't drive my car at all

Section 9: Sleeping

- I have no trouble sleeping
- My sleep is slightly disturbed (less than 1 hr sleepless)
- My sleep is mildly disturbed (1-2 hrs sleepless)
- My sleep is moderately disturbed (2-3 hrs sleepless)
- My sleep is greatly disturbed (3-5 hrs sleepless)
- My sleep is completely disturbed (5-7 hrs sleepless)

Section 10: Recreation

- I am able to engage in all my recreation activities with no neck pain at all
- I am able to engage in all my recreation activities, with some pain in my neck
- I am able to engage in most, but not all of my usual recreation activities because of pain in my neck
- I am able to engage in a few of my usual recreation activities because of pain in my neck
- I can hardly do any recreation activities because of pain in my neck
- I can't do any recreation activities at all.

Scoring of NDI: For each section the total possible score is 5: if the first statement is marked the section score = 0, if the last statement is marked it = 5. If all ten sections are completed the score is calculated.
(Score: /50 Transform to percentage score x 100 = %points)

- 0-4points (0-8%) no disability,
- 5-14points (10 – 28%) mild disability,
- 15-24points (30-48%) moderate disability,
- 25-34points (50- 64%) severe disability,
- 35-50points (70-100%) complete disability

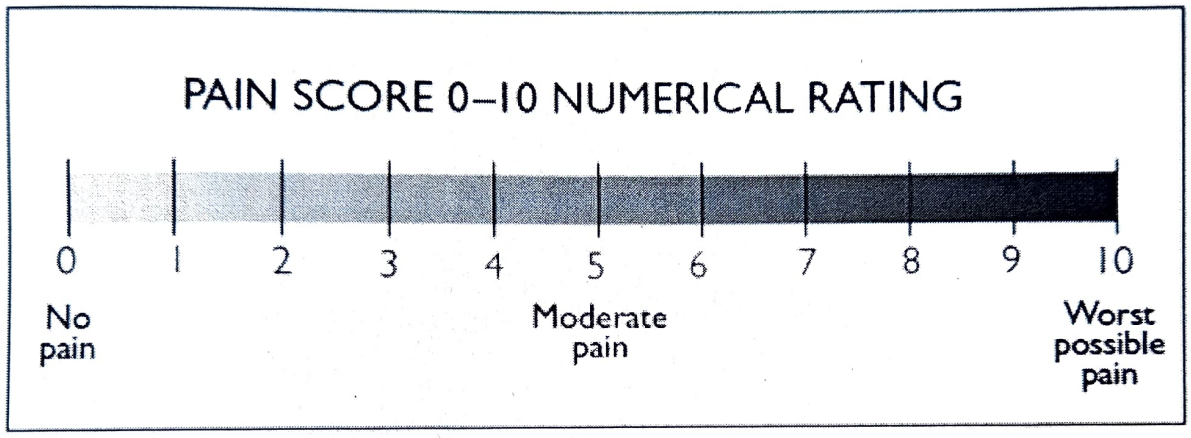
Annexure II

Tampa Scale for Kinesiophobia

1. I'm afraid that I might injury myself if I exercise	1	2	3	4
2. If I were to try to overcome it, my pain would increase	1	2	3	4
3. My body is telling me I have something dangerously wrong	1	2	3	4
4. My pain would probably be relieved if I were to exercise	1	2	3	4
5. People aren't taking my medical condition seriously enough	1	2	3	4
6. My accident has put my body at risk for the rest of my life	1	2	3	4
7. Pain always means I have injured my body	1	2	3	4
8. Just because something aggravates my pain does not mean it is dangerous	1	2	3	4
9. I am afraid that I might injure myself accidentally	1	2	3	4
10. Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent my pain from worsening	1	2	3	4
11. I wouldn't have this much pain if there weren't something potentially dangerous going on in my body	1	2	3	4
12. Although my condition is painful, I would be better off if I were physically active	1	2	3	4
13. Pain lets me know when to stop exercising so that I don't injure myself	1	2	3	4
14. It's really not safe for a person with a condition like mine to be physically active	1	2	3	4
15. I can't do all the things normal people do because it's too easy for me to get injured	1	2	3	4
16. Even though something is causing me a lot of pain, I don't think it's actually dangerous	1	2	3	4
17. No one should have to exercise when he/she is in pain	1	2	3	4

Annexure III
Numerical Pain Rating Scale (NPRS)

The 11-point numeric scale ranges from '0' representing one pain extreme (e.g. "no pain") to '10' representing the other pain extreme (e.g. "pain as bad as you can imagine" or "worst pain imaginable"). (Rodriguez CS et al 2001)



APPENDIX

Manav Rachna International Institute of Research and Studies

(Deemed to be University) Faculty of Allied Health Sciences Department of Physiotherapy

.....

Consent Form

I, Khyati Varshney, PhD Scholar, 12203MRIIRSPHD2N002, Faculty of Allied health Science, Manav Rachna International Institute of Research & Studies is working on a Research Project, titled,

"Exploring relation between kinesiophobia, neck proprioception, deep neck flexor endurance in Individuals with Text Neck Syndrome: Impact of tele- rehabilitation"

The purpose of the study is to explore the relation between kinesiophobia, neck proprioception, deep neck flexor endurance and Impact of tele- rehabilitation in Individuals with Text Neck Syndrome.

Duration of Participation

The exercises will be performed for 3 weeks.

Explanation of Procedure

If you decide to participate, you will be asked to, provide consent for the collection and analysis of your data.

Potential Benefit of Participation

While specific benefits cannot be guaranteed, potential benefits of participating in this research is that it will provide better treatment options.

Compensation

Financial Considerations

There are no special fees for participating in this study. However, the cost for participating

_____

will be borne by the Principal Investigator (PI) of the project. This includes the structured exercise program which will be instructed and sessions will be free of cost.

Voluntary Nature of the Study

The participation of the patient in the study is purely voluntary in nature.

Right to withdraw

Participants are free to withdraw their consent to participate in this study anytime. Refusal to participate or withdrawal will not affect your future care and will involve no penalty to you. In the event, new information becomes available that may affect your willingness to participate in this study, this information will be given to you so that you can make an informed decision about whether or not to continue your participation.

Assurance of Anonymity and Confidentiality

The identity of the patient and data collected will remain absolutely confidential and anonymous. Furthermore, only averaged data will be shared and/ or published, thus maintaining anonymity of the patient.

Potential Risks or Discomforts

The potential risks associated with participating in this study are no or minimal. However, some individuals may experience temporary muscle soreness or fatigue due to engaging in the exercise and therapy sessions. Every effort will be made to minimize these risks by evaluation of preliminary information relating to your health and fitness and by careful observations during the procedure.

Contact Information: Khyati Varshney Ph.D Scholar,
Batch - 2022

AE-40, AE Block, Shalimar Bagh, Delhi
Contact No: +91 9058082823 (Aadhar No: 358510848339)

Declaration

-I confirm that I have read and understood the information and purpose of the study

-I have been informed about the quantity of data to be taken and the use that will be made of the data.
-I agree to the data being used for immediate routine measurements, and for relevant results to be provided to me.

-I agree that my data may be stored for future research. This is on the understanding that the investigations will be for medical research only and my results will be kept confidential.
-I have read this form and the research study has been explained to me.
-I have been given the opportunity to ask questions and my questions have been answered to my satisfaction.

-If I have additional questions, I have been told who to contact
-I agree to participate in the research study described above. I can ask for a copy of this consent form after I sign it if I want to.

Participant's Name & Signature :

Participant Aadhar card No :
PAN No :
Please attach the copy of Aadhar card. Name of the researcher & Signature: **Khyati Varshney**
Ph.D Scholar,
Batch - 2022
AE-40, AE Block, Shalimar Bagh, Delhi
Contact No: +91 9058082823 (Aadhar No: 358510848339)

Name of the Supervisor & Signature: Dr. Kshitija Bansal
Professor
Department of Physiotherapy Faculty of Allied Health Sciences

Manav Rachna International Institute of Physiotherapy Faridabad, Haryana
Contact No: 9810314488

MANAV RACHNA
vidyanatariksha

Dr. O.P. Bhalla Central Library
Manav Rachna International Institute of Research and Studies
(A deemed-to-be-university under section 3 of UGC Act 1956)

SIMILARITY VERIFICATION CERTIFICATE

Title: Relation Between Deep Neck flexor Endurance, Proprioception, Kinesiophobia and Effect of Tele-rehabilitation: A Multi-Phasic study on Text Neck Syndrome.

Researcher: Khyati Varshney

Registration Number: 12203MRIIRSPHD2N002

Supervisor: Dr. Kshitija Bansal

Department: Physiotherapy, SAHS

This is to certify that the above mentioned Short Synopsis/Thesis was scanned for similarity index through Turnitin Software on 16/10/25 with submission ID 1:3360243470 and the similarity index was found to be 5 %. The complete report running into 20 Pages, 5,402 Word count with File Size 329.8 KB/MB is being forwarded to the Research Supervisor/DRC/DRB for review.

Rajesh Kumar
Dr. Rajesh Kumar
University Librarian
Dr. O.P. Bhalla Central Library
Manav Rachna International
Institute of Research & Studies
Faridabad

Date: 16/oct/2025

The complete report of the above Short Synopsis/Thesis has been reviewed and the similarity index is below the accepted norms as per the University Grants Commission (Promotion of Academic Integrity and Prevention of Plagiarism in Higher Educational Institutions) Regulations 2018. The Short Synopsis/Thesis may be considered for further processing

Research Scholar

Research Supervisor

turnitin Page 1 of 24 - Cover Page

Khyati Varshney

Relation Between Deep Neck Flexor Endurance, Proprioception, Kinesiophobia and effect of Tele-rehabilitatio...

Quick Submit

Quick Submit

Manav Rachna International University

Dr. Rajesh Kumar
University Librarian
Dr. O.P. Khalla Central Library
Manav Rachna International
Institute of Research & Studies
Faridabad

Document Details

Submission ID
trn:oid:::1:3360243470

Submission Date
Oct 3, 2025, 3:25 PM GMT+5:30

Downloaded Date
Oct 3, 2025, 3:36 PM GMT+5:30

File Name
e-rehabilitation_A_Multi-Phasic_Study_on_Text_Neck_Syndrome.docx

File Size
329.8 KB

20 Pages

5,402 Words

28,798 Characters

Excluding matches
less than 14 words

5% Overall Similarity

Top sources are listed below

Filtered from the Report

- Bibliography
- Small Matches (less than 14 words)

Match Groups

11 Not Cited or Quoted 5%
Matches with neither in-text citation nor quotation marks

1 Missing Quotations 0%
Matches that are still very similar to source material

0 Missing Citation 0%
Matches that have quotation marks, but no in-text citation

0 Cited and Quoted 0%
Matches with in-text citation present, but no quotation marks

Top Sources

5% Internet sources
1% Publications
4% Submitted works (Student Papers)

Integrity Flags

0 Integrity Flags for Review

Turnitin's integrity flags identify a small number of documents that may contain manipulations that could affect the originality report. If we suspect an issue, we'll flag it for you to review.

A flag is not necessarily an indication of misconduct. Review the flagged text to determine whether it should be considered.

turnitin

Match Groups

- 11 Not Cited or Quoted 1%
- 1 Missing Quotations 0%
- 0 Missing Citations 0%
- 0 Cited and Quoted 0%

Top Sources

- 1% Internet sources
- 1% Publications
- 0% Submitted works (Student Papers)

Top Sources

1	Internet bbrc.in	<1%
2	Internet www.physio-pedia.com	<1%
3	Internet clinicaltrials.gov	<1%
4	Student papers Wheeler High School	<1%
5	Internet www.ijhsr.org	<1%
6	Internet 0-josr--online-biomedcentral-com.brum.beds.ac.uk	<1%
7	Student papers Vrije Universiteit Amsterdam	<1%
8	Internet ijpot.com	<1%
9	Internet ijhsr.org	<1%
10	Student papers Coventry University	<1%

11	Internet journals.lww.com	<1%

Dr. Rajesh Kumar
University Librarian
Dr. O.P. Bhalla Central Library
Manav Rachna International
Institute of Research & Studies
Faridabad

Excluding matches
less than 14 words